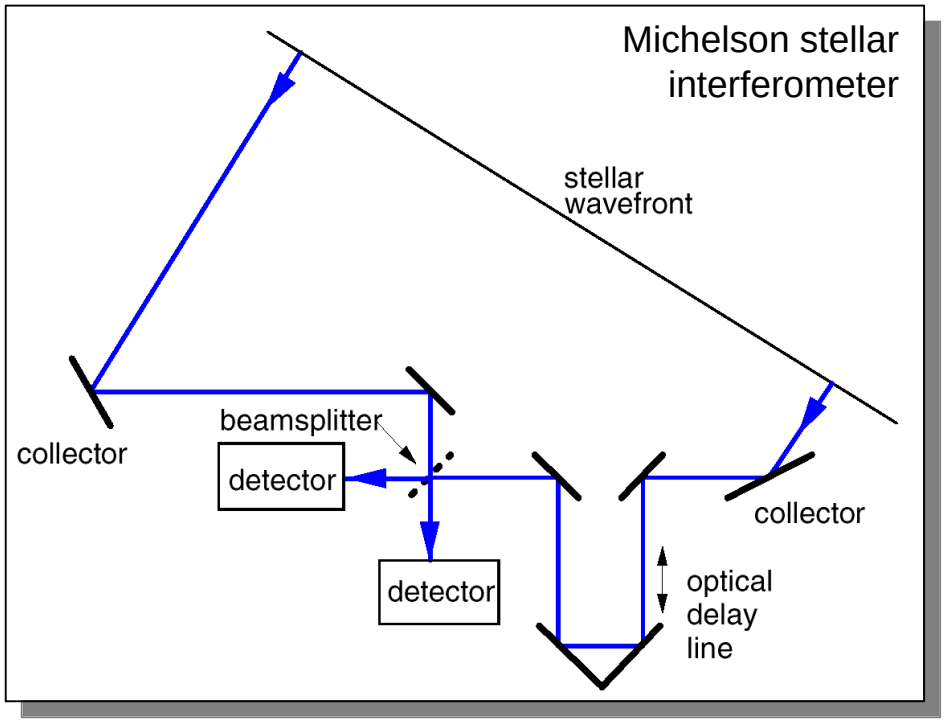
Wide-field Pupil Plane Imaging Interferometry



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SPECS
Submillimeter Probe of the Evolution of Cosmic Structure
SPIRIT

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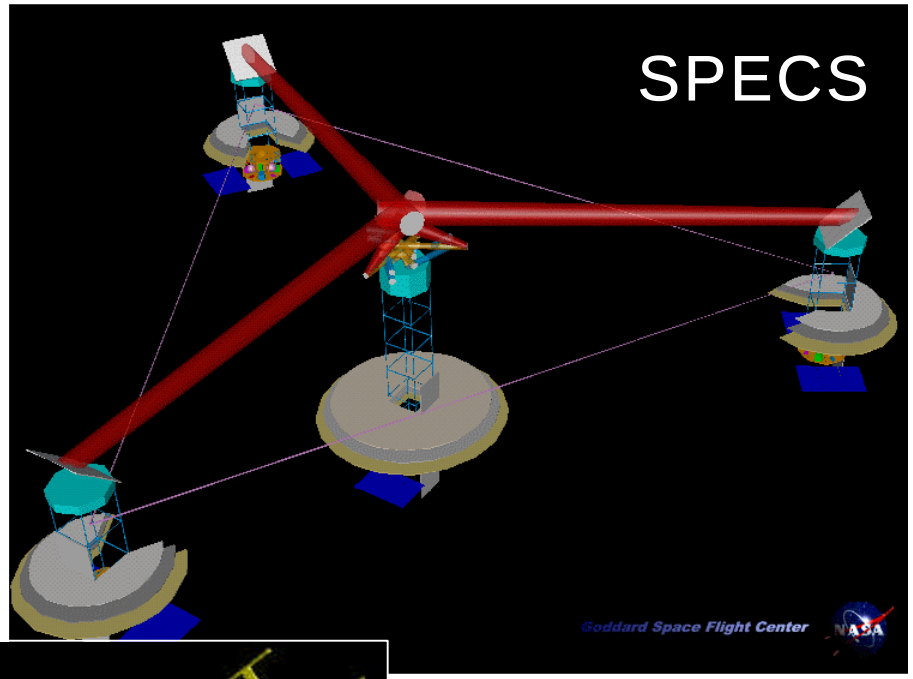
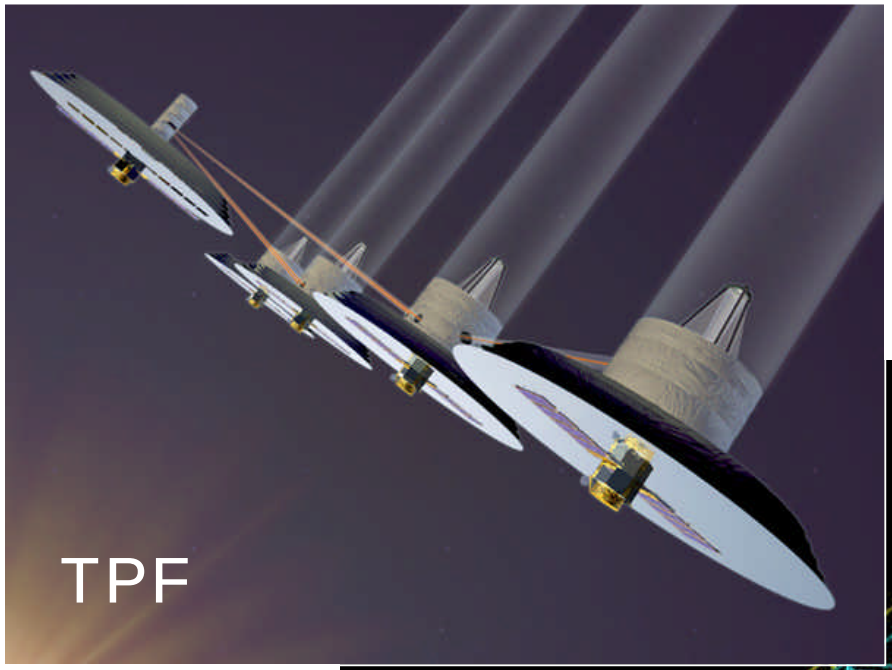
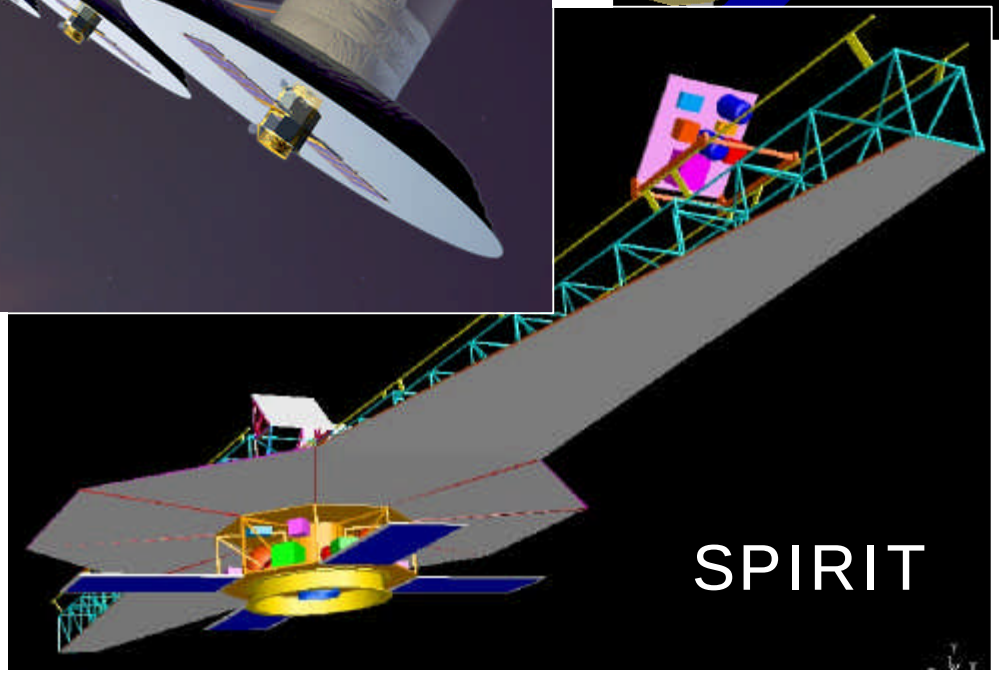
Roadmap applications

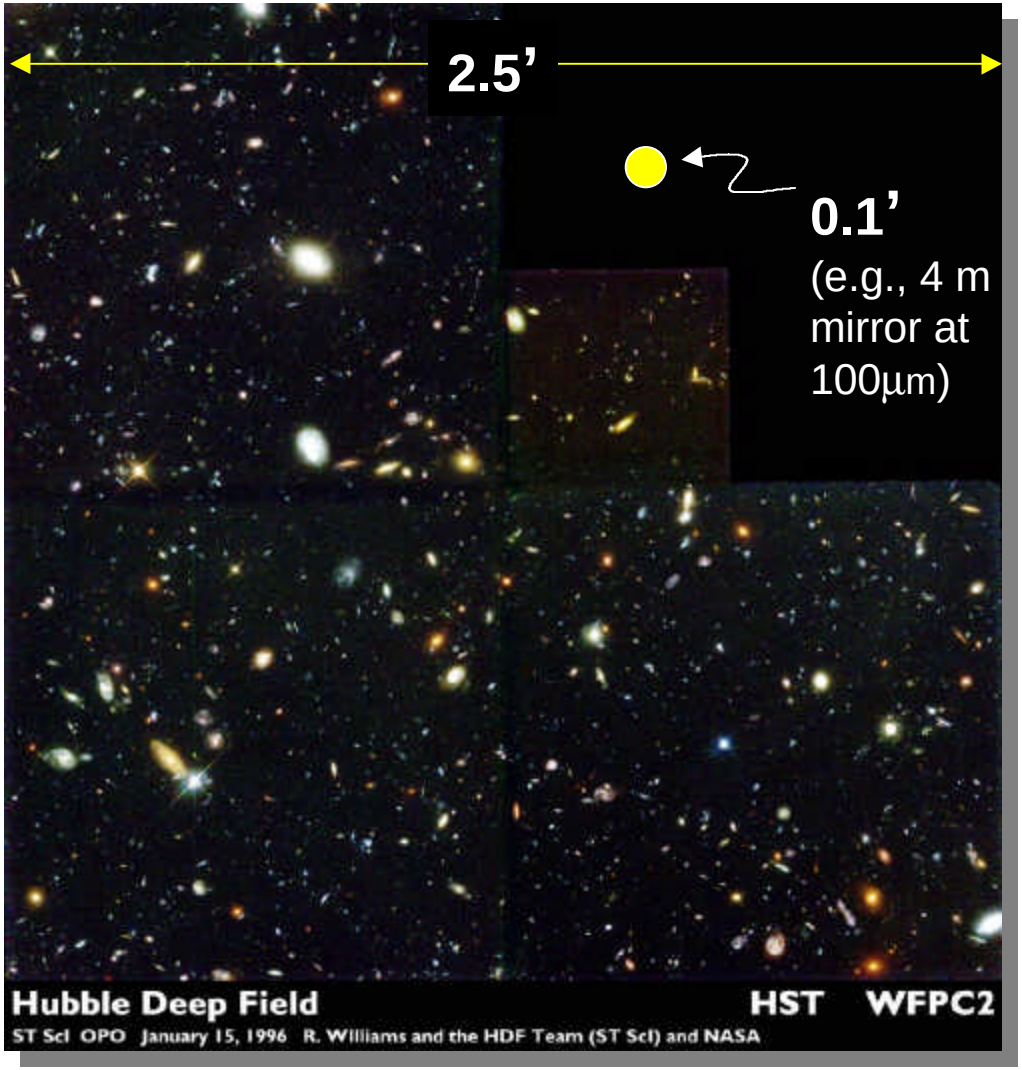






Decade Report says develop enabling technologies for space-based IR interferometry

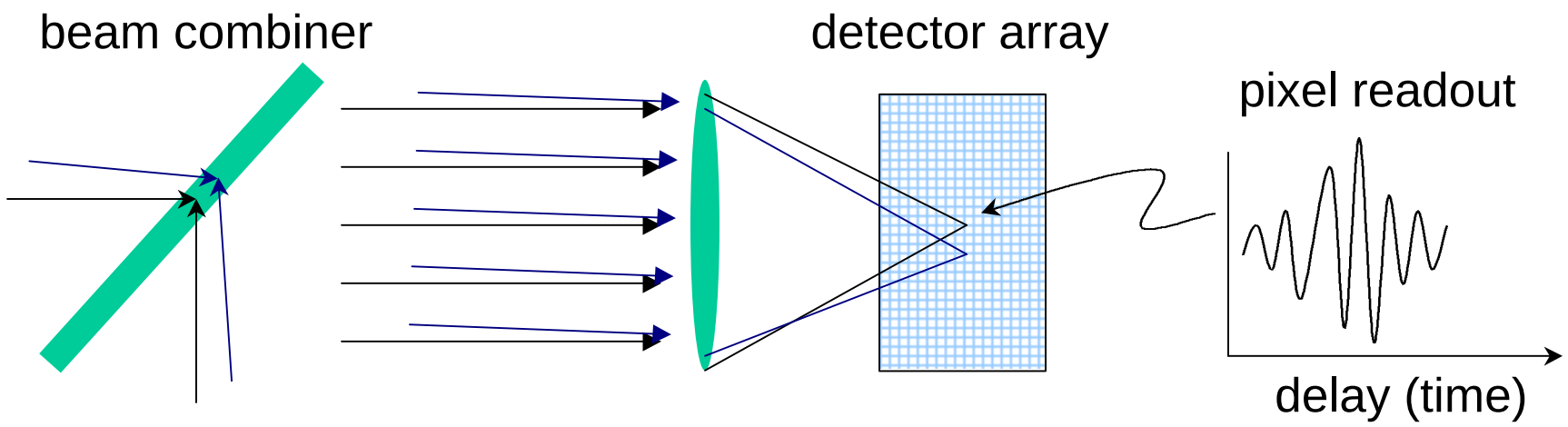
Science motivation



- FOV in traditional stellar interferometer is limited to primary beam of individual telescope apertures, ~ λ / D_{tel} radians
- This is much smaller than the FOV typically desired
- Something like the Hubble WF/PC field (a few arcminutes) would be nice

Mosaicing analog

- Pupil plane beam combination
- Record fringe pattern in time domain in each pixel, as in conventional Michelson
- Detector array sees multiple “primary beams” in parallel
- Add stroke to optical delay line to compensate geometric delay, see off axis
- Total stroke provides both wider FOV and spectroscopy (FTS)
- Pixels Nyquist sample contiguous primary beams



Research plan

- Develop testbed instrument
- Generate portfolio of data sets
  - sources of various levels of spatial and spectral complexity
- Develop and refine synthesis imaging algorithms
  - adapt existing imaging software, data reduction environments (e.g., MIRIAD, AIPS++)
  - new algorithms and software for mosaicing in optical interferometry for improved performance (imaging and efficiency)
- Model testbed end-to-end system performance
  - understand error sources
  - improve testbed
  - facilitate design of interferometers for space